United States
Department of
Agriculture

Soil
Conservation
Service

Bozeman,
Montana

MONTANA
WATER SUPPLY OUTLOOK

October 1, 1986

Foreword

How Forecasts Are Made

Most of the annual streamflow in the Western United States originates as snowfall. This snowfall accumulates high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are viewed in conjunction with snowpack data to prepare runoff forecasts. This report presents a comprehensive picture of water supply outlook conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data and narratives describing current conditions.

Streamflow forecasts are cooperatively generated by Soil Conservation Service and National Weather Service hydrologists. Forecasts become more accurate as more data affecting runoff becomes known. For this reason, forecasts are issued that reflect three future precipitation conditions — Below Normal, Average, and Above Normal. These forecasts are termed reasonable minimum, most probable, and reasonable maximum. Actual streamflow can be expected to fall between the lower and upper forecast values eight out of ten years.

Snowpack data are obtained by using a combination of manual and automated measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation, temperature, and other parameters are monitored on a daily basis and transmitted via radio telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

For More Information

Copies of Monthly Water Supply Outlook Reports and other reports may be obtained from the states listed below. Because of the limited space, snow survey measurements are not published in monthly reports. An annual snow survey data summary is published by the Soil Conservation Service for each of the western states. Historical snow survey data may be obtained at those same offices.

STATE	ADDRESS
Alaska	201 East 9th Ave., Suite 300, Anchorage, AK 99501-3687
Arizona	201 East Indianola, Suite 200, Phoenix, AZ 85012
Colorado (New Mexico)	2490 West 26th Ave., Denver, CO 80211
Idaho	304 North 8th Street, Room 345, Boise, ID 83702
Montana	10 East Babcock, Room 443, Federal Building, Bozeman, MT 59715
Nevada	50 South Virginia Street, Third Floor, Reno, NV 89505
Oregon	1220 Southwest 3rd Ave., 16th Floor, Portland, OR 97204
Utah	4402 Federal Building, 125 South State Street, Salt Lake City, UT 84147
Washington	360 U.S. Court House, Spokane, WA 99201
Wyoming	Federal Building, 100 East "B" Street, Casper, WY 82602

In addition to state reports, a Water Supply Outlook for the Western United States is published by the Soil Conservation Service and National Weather Service monthly, January through May. Reports may be obtained from the Soil Conservation Service, West National Technical Center, 511 Northwest Broadway, Room 547, Portland, OR 97209.

Published by other agencies:

Water Supply Outlook Reports prepared by other agencies include: California — Snow Survey Branch, California Department of Water Resources, P.O. Box 388, Sacramento, CA 98502; British Columbia — The Ministry of Environment, Water Investigations Branch, Parliament Buildings, Victoria, British Columbia, V8V 1X5; Yukon Territory — Department of Indian and Northern Affairs, Northern Operations Branch, 200 Range Road, Whitehorse, Yukon Territory, Y1A 3V1; Alberta, Saskatchewan, and N.W.T. — The Water Survey of Canada, Inland Waters Branch, 110-12 Avenue S.W., Calgary, Alberta, T3C 1A6.

Montana
Water Supply Outlook

and

Federal – State – Private
Cooperative Snow Surveys

Issued by

Wilson Scaling
Chief
Soil Conservation Service
Washington, D.C.

Released by

Glen H. Loomis
State Conservationist
Soil Conservation Service
Bozeman, Montana

Prepared by

Phillip E. Farnes
Snow Survey Supervisor
Soil Conservation Service
10 E. Babcock
Bozeman, Montana 59715

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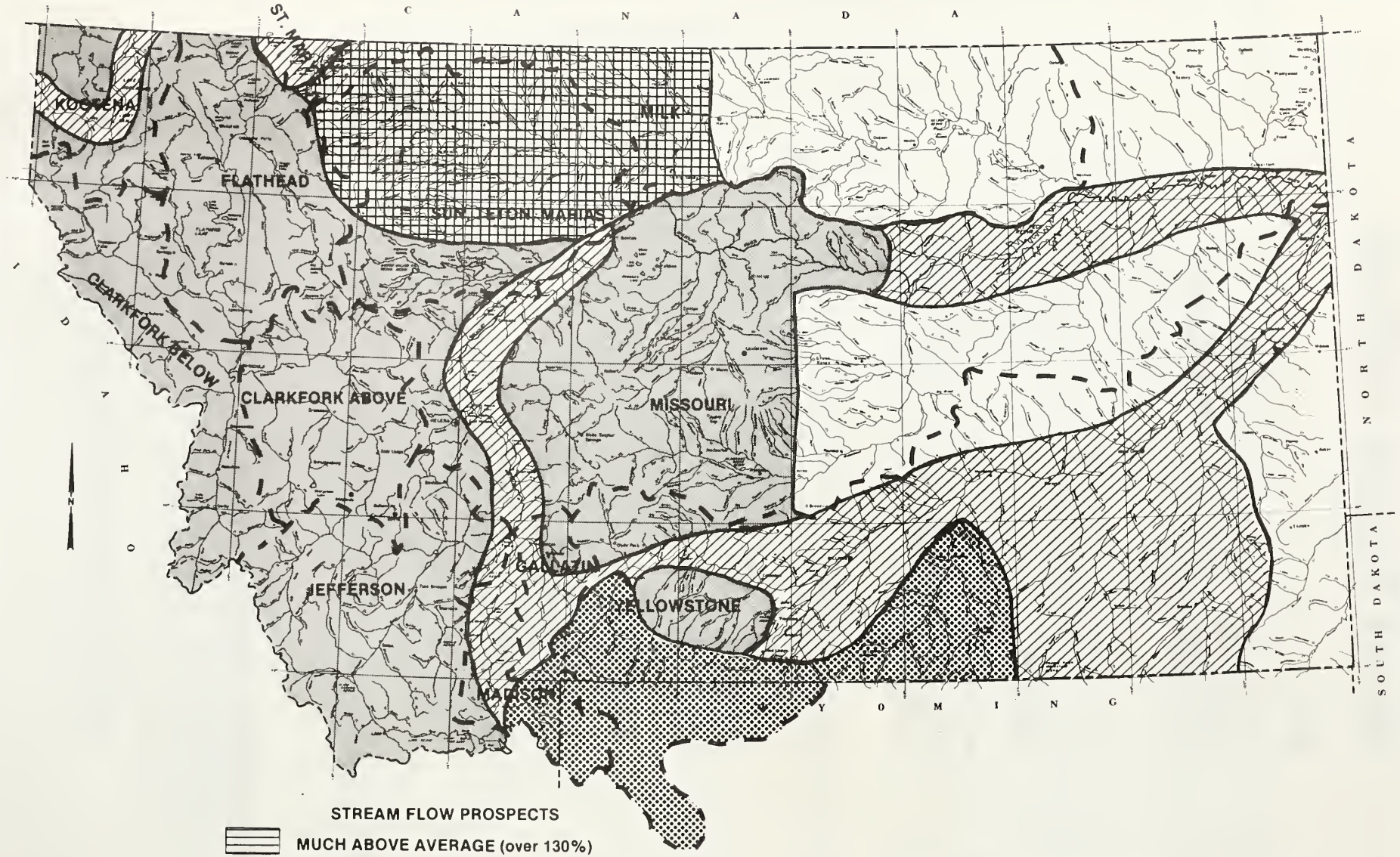
U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



STREAMFLOW PROSPECTS FOR MONTANA

Spring and Summer Period

Provisional 1986 April–September Runoff

STREAM FLOW PROSPECTS

- MUCH ABOVE AVERAGE (over 130%)
- ABOVE AVERAGE (110-130%)
- NEAR AVERAGE (90-110%)
- BELOW AVERAGE (70-90%)
- MUCH BELOW AVERAGE (below 70%)
- NOT FORECAST

0 25 50 75 100 MI

0 50 100 150 KM

SOURCE:
Information provided by SCS Snow Survey Personnel.

JUNE 1985 4-R-39296

GENERAL OUTLOOK

SNOWPACK:

Last year, fall came as a welcome relief to Montana. Above average precipitation helped to replenish depleted soil moisture levels caused by the summer's drought and started the snowpack accumulation in high elevations. Moisture levels remained near or above average through November with the snowpacks accumulating to near average levels over most of the state. By the new year, however, different moisture patterns dropped the snowpacks to below average with the Bitterroot and portions of the Big Hole and Upper Clark Fork drainages having well below average snow accumulations. Some improvement in snow conditions was seen during February when areas in the southern half of the state received up to twice normal precipitation. Exceptions were the Gallatin and parts of the Red Rock, Musselshell, and Yellowstone drainages. As temperatures began warming in March, there was little improvement in conditions. Low and mid-elevation snows began melting, causing some streams with low elevation headwaters to reach snowmelt peak a month earlier than normal. May began cool and wet with precipitation being above average over most of the state. Snowpacks remained generally below average except for the Madison River headwaters in Yellowstone National Park. During late May, warm temperatures created snowmelt rates nearly twice that of normal causing streamflows to peak at average or above average levels. By early June, only high elevation sites had snow remaining.

PRECIPITATION:

April through September precipitation was near average over most of the western areas and southern one-third of the state and above average north of the Yellowstone and east of the line through Helena and Cut Bank. Headwaters of the Ruby above Ruby Reservoir, Red Rock River above Lima Reservoir, Madison River above the West Fork, and Grasshopper Creek, Wise River and parts of the lower Big Hole in addition to most of the Yellowstone River headwaters in Yellowstone National Park had above average spring and summer precipitation. In many areas, especially in the Milk and Missouri drainages, heavy precipitation occurred in September. This resulted in substantial flooding on the Milk River below Havre, the Missouri River drainages surrounding Fort Peck Reservoir and some Yellowstone tributaries downstream from Miles City. One area in the state showed below average spring and summer precipitation. This area straddled the Continental Divide from west of Helena to Glacier National Park.

RESERVOIR:

Storage is near average in most irrigation reservoirs with a few having above average storage. Storage in most larger multipurpose reservoirs is near average.

STREAMFLOW:

April through September runoff varied from above average in the Madison, Yellowstone and Bighorn River headwaters to well below average runoff in the Marias and upper Milk River drainages. Most drainages west of the Divide as well as those in central Montana had below average runoff. The main stem of the Missouri and Yellowstone Rivers had flows a little below average. There was some shortage of irrigation water supplies in southwest Montana and northeast Montana. Other areas had generally adequate irrigation supplies. With the heavy rainfall in September, most areas have soils that are wetter than normal. However, some areas in central and south central Montana are reporting near average soil moisture. This will help the runoff next year as it will require less snowmelt to recharge the soils. This also could be a problem for the streams in eastern Montana and the Milk River. If the soils freeze before snow accumulates, and if snowmelt begins before the soils thaw, large runoffs can be generated from relatively small snowpacks. This is the same climatic condition that generated the record floods on the Milk River in the spring of 1952. The winter snowpacks will still be the most important factor in determining next years runoff.

1986 SNOW COVER COMPARISONS

(as a percent of average)

	JAN.1	FEB.1	MAR.1	APR.1	MAY.1
COLUMBIA RIVER DRAINAGE					
Kootenai	70	70	72	65	56
Flathead	84	74	79	70	67
Upper Clark Fork	70	69	88	79	74
Lower Clark Fork	74	68	80	85	65
Bitterroot	62	65	91	80	72
MISSOURI RIVER DRAINAGE					
Jefferson	87	80	102	92	88
Madison	101	90	105	95	89
Gallatin	70	65	80	74	67
Missouri Main Stem	98	84	96	84	69
Judith-Musselshell	98	83	92	80	65
Sun-Teton-Marias	91	73	82	72	61
Milk	70	59	58	48	31
YELLOWSTONE RIVER DRAINAGE					
Yellowstone (above Bighorn)	86	81	100	91	82
Bighorn	115	103	140	116	112
Little Bighorn	130	106	109	103	102
Tongue	138	100	117	108	106
Powder	118	101	117	110	105
SASKATCHEWAN RIVER DRAINAGE					
St. Mary's	67	69	71	52	48

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RESERVOIR STORAGE (Thousand Acre-Feet) End of Month September 30, 1986

BASIN OR STREAM	RESERVOIR	USEABLE CAPACITY	USEABLE STORAGE THIS YEAR	USEABLE STORAGE LAST YEAR	USEABLE STORAGE AVERAGE
		COLUMBIA			
Kootenai	Koocanusa	5,748.2	5,126.0	5,086.0	5,164.0
Flathead	Hungry Horse	3,451.0	2,995.0	2,678.0	3,189.0
	Flathead Lake	1,791.0	1,761.0	1,767.0	1,735.0
	Camas (4)	45.2	20.8	16.7	18.1
	Mission Valley (8)	100.3	23.3	32.1	26.8
Clark Fork	Georgetown Lake	31.0	30.5	23.1	28.3
	Lower Willow Creek	4.9	0.9	0.5	0.9
	Nevada Creek	12.6	---	2.3	4.0
	Noxon Rapids	334.6	324.4	317.6	326.4
Bitterroot	Painted Rocks	31.7	---	---	22.6
	Como	34.9	2.4	0.6	2.5
		MISSOURI			
Beaverhead	Lima	84.0	23.6	14.5	30.0
	Clark Canyon	255.6	137.7	92.8	120.6
Ruby	Ruby	38.8	11.4	8.0	11.8
Madison	Hebgen Lake	377.5	349.6	357.2	336.5
	Ennis Lake	41.0	37.3	35.1	36.7
Gallatin	Middle Creek	8.0	3.9	3.7	3.1
Missouri	Canyon Ferry	2,043.0	1,734.0	1,630.0	1,748.0
	Hauser & Helena	61.9	63.0	63.0	58.9
	Helena Valley	9.2	6.5	5.9	6.9
	Lake Helena	10.4	10.9	10.9	10.4
	Holter Lake	81.9	81.0	81.0	77.8
	Fort Peck Lake	18,910.0	15,960.0	14,140.0	16,090.0
Smith	Smith River	10.6	7.8	3.5	5.6
	Newlan Creek	12.4	11.3	9.5	10.1
Musselshell	Bair	7.0	5.7	0.0	3.2
	Martinsdale	23.1	12.0	0.2	9.7
	Deadman's Basin	72.2	---	11.9	35.4
Sun	Gibson	99.1	30.3	43.9	29.1
	Willow Creek	32.2	25.0	15.1	19.4
	Pishkun	32.0	5.8	19.8	16.7
Marias	Lower Two Medicine	11.9	---	---	4.6
	Four Horns	19.2	---	---	11.6
	Swift	30.0	10.0	8.2	11.9
	Lake Frances	111.9	74.4	32.5	71.2
	Elwell (Tiber)	1,347.0	807.8	794.4	606.7
Milk	Beaver Creek	3.5	3.1	2.0	2.1
	Fresno	127.2	67.8	52.0	67.6
	Nelson	66.8	54.3	14.3	42.2
		HUDSON BAY			
St. Mary's	Lake Sherburne	64.8	21.9	4.2	7.6
		YELLOWSTONE			
Stillwater	Mystic Lake	21.0	18.6	19.7	19.5
Clark's Fork	Cooney	27.4	16.5	9.2	13.2
Tongue	Tongue River	68.0	16.1	12.5	24.8
Bighorn	Bighorn Lake	1,356.0	1,025.0	875.1	749.0

The Following Organizations Cooperate With The Soil Conservation Service In Snow Survey Work

Canadian

Department of the Environment
- Atmospheric Environment Service
- Water Management Service

British Columbia Ministry of Environment
- Inventory and Engineering Branch, Hydrology Section

Alberta Environment
- Technical Services Division

Federal

U.S. Department of Agriculture
- Forest Service

U.S. Department of the Army
- Corps of Engineers

U.S. Department of Commerce
- NOAA, National Weather Service
- National Environmental Satellite Service

U.S. Department of the Interior
- Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Reclamation

U.S. Department of Energy
- Bonneville Power Administration

State

Montana Conservation Districts
Montana Department of Fish, Wildlife, and Parks
Montana Department of Natural Resources and Conservation
Montana Department of State Lands
Montana State University - Agricultural Experiment Station
University of Montana - School of Forestry

Private

Big Sky of Montana
Butte Water Company
Flathead Valley Community College
Montana Power Company
Pondera County Canal & Reservoir Company

Other organizations and individuals furnish information for the snow survey reports. Their cooperation is gratefully acknowledged.

IMPORTANT NOTICE

Water Supply Outlook for Montana

IF YOU WISH TO RECEIVE THE WATER SUPPLY OUTLOOK REPORT FOR MONTANA IN 1987, YOU MUST RETURN THIS MAILER.

The Water Supply Outlook for Montana will have very few changes in 1987. One important change will be that snow course readings will be published in the monthly reports. However, we will continue to send a preliminary snow data report to those who may need the information before the monthly report is received. In the fall or early winter, we will publish an Annual Data Summary showing snow and precipitation readings.

Indicate the reports you want to receive in 1987. If you want more than one copy of a report, please indicate the number.

_____ Monthly Water Supply Outlook Report

_____ Annual Data Summary

_____ Preliminary Snow Data Report

IF THIS MAILER IS NOT RETURNED, YOUR NAME WILL BE DELETED FROM OUR MAILING LIST.

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